

CANCER OF LUNG RELATED TO SMOKING BEHAVIOR

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Detailed observations of the minutiae of smoking behavior of humans suggested the existence of wide variations in this behavior. Simulation of these various models of puffing behavior on an analytic smoking machine showed that significantly different amounts of tobacco tar were retrievable for each. Lung cancer and control patients were then observed to determine whether and the extent to which the cases exhibited high tar-yield smoking models. It was found that risk of lung cancer increases with the mean number of puffs taken per cigarette and with increases in the average length of time taken to smoke a cigarette regardless of age or amount smoked per day. This was also generally true when analyses were carried out specifically for variations in the number of puffs taken per cigarette. The exception to this was observed only where the largest number of puffs were taken per cigarette. Finally, it was shown that taking more puffs towards the end of a cigarette entails a higher risk than puffing regularly, and that the most frequently exhibited puffing patterns, puffing most often at the beginning, carried the lowest risk. We suggest that if these results were upheld in future replications, further evidence would be at hand of a dose-response relationship linking lung cancer and exposure to tobacco tar. Furthermore, these data would suggest that smokers could lower their risk by taking fewer puffs per cigarette, taking them shortly after lighting up, and smoking with only short intervals between puffs.

A GREAT DEAL OF RESEARCH ON VARIOUS populations utilizing various study designs has shown increased risk of lung cancer with increasing exposure to tobacco smoke. Thus, increases in risk have been related to increases in daily amount smoked and duration of smoking in years. This led us to examine the dose-response relationship in a different way. Our detailed observations of individuals smoking cigarettes revealed rather wide variations in smoking behavior patterns. Simulations of these variations via analytic smoking machine showed that substantial differences in tar yield are characteristic of the different models of behavior.¹ In view of the relationship of increasing lung cancer risk with increased amount smoked, one would hypothesize that individuals exhibiting smoking patterns which are high in tar yield would also have higher risks of lung cancer.

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If the hypothesis were upheld, dose-response evidence of a different kind would implicate tobacco tar as a carcinogen. Equally important, if certain smoking methods were found to characterize cases more than controls, information might be at hand out of which measures to reduce risk could be fashioned. A large proportion of even heavy smokers do not develop lung cancer. A study of smokers who do and do not develop lung cancer could be useful in developing further knowledge of factors predisposing to and protecting against lung cancer. Such study could involve inhalation patterns, differences in brand smoked, and many other facets of behavior. Our present concern was with risk as related to models of smoking behavior which we had previously examined by smoking machine; specifically patterns of puffing exhibited throughout the time during which cigarettes are smoked.

Observations of individuals smoking cigarettes in public places such as hotel lobbies, bus, railroad, airline, and hospital waiting rooms and wards in the Buffalo area, revealed that a number of variations in behavior are commonly exhibited. There were large differences in the number of puffs taken on given cigarettes by smokers, in the length